



Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11) **EP 0 949 538 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**23.02.2000 Bulletin 2000/08**

(51) Int Cl.7: **G03F 1/14, H01J 37/317**

(43) Date of publication A2:  
**13.10.1999 Bulletin 1999/41**

(21) Application number: **99302441.3**

(22) Date of filing: **29.03.1999**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

(30) Priority: **08.04.1998 US 57420**

(71) Applicant: **LUCENT TECHNOLOGIES INC.  
Murray Hill, New Jersey 07974-0636 (US)**

(72) Inventors:  
• **Liddle, James Alexander  
Westfield, New Jersey 07090 (US)**

• **Weber, Gary Robert  
Whitehouse Station, New Jersey 08889 (US)**  
• **Novembre, Anthony Edward  
Martinsville, New Jersey 08836 (US)**

(74) Representative:  
**Johnston, Kenneth Graham et al  
Lucent Technologies (UK) Ltd,  
5 Mornington Road  
Woodford Green Essex, IG8 OTU (GB)**

(54) **Membrane mask for projection lithography**

(57) An improved, scattering-type mask for use in a charged-particle beam lithography process comprises the mask having a membrane portion and a scattering portion, the membrane portion being fabricated with a conductive material or a plurality of materials in which

one of them is conductive. The conductive nature of the membrane portion mitigates the accumulation of charge in the mask, thereby enhancing the definition of the charged-particle pattern transferred from the mask onto the wafer under fabrication and reducing the distortion obtained with the system.

**EP 0 949 538 A3**



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 99 30 2441

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,A	US 5 079 112 A (GIBSON JOHN M ET AL) 7 January 1992 (1992-01-07) ---		G03F1/14 H01J37/317
X	PATENT ABSTRACTS OF JAPAN vol. 018, no. 238 (E-1544), 6 May 1994 (1994-05-06) & JP 06 029193 A (MITSUBISHI MATERIALS CORP;OTHERS: 01), 4 February 1994 (1994-02-04) *see also P.10,L.15 of the application* * abstract *	1-10	
A	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 09, 30 September 1996 (1996-09-30) & JP 08 124833 A (NIKON CORP), 17 May 1996 (1996-05-17) * abstract *		
A	PATENT ABSTRACTS OF JAPAN vol. 012, no. 293 (E-645), 10 August 1988 (1988-08-10) & JP 63 070422 A (FUJITSU LTD), 30 March 1988 (1988-03-30) * abstract *		TECHNICAL FIELDS SEARCHED (Int.Cl.6)  G03F H01J
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>21 December 1999</b>	Examiner <b>Haenisch, U</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>&amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 30 2441

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-12-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5079112 A	07-01-1992	CA 2020237 A,C DE 69023073 D DE 69023073 T EP 0412690 A ES 2078949 T HK 34696 A JP 3101214 A JP 8034169 B JP 2857384 B JP 10074695 A US 5130213 A US 5258246 A	08-02-1991 23-11-1995 21-03-1996 13-02-1991 01-01-1996 08-03-1996 26-04-1991 29-03-1996 17-02-1999 17-03-1998 14-07-1992 02-11-1993
JP 06029193 A	04-02-1994	NONE	
JP 08124833 A	17-05-1996	US 5789119 A	04-08-1998
JP 63070422 A	30-03-1988	NONE	